

# **METHODS FOR FORMING A METAL WIRING LAYER ON AN INTEGRATED CIRCUIT DEVICE AT REDUCED TEMPERATURES**

## **ABSTRACT OF THE DISCLOSURE**

Methods of forming a metal wiring layer on an integrated circuit include forming an insulating pattern including a recess region on an integrated circuit substrate. A metal layer is formed in the recess region and on a top surface of the insulting pattern. The metal layer is removed from the top surface of the insulating  
5 pattern adjacent the recess region and from an upper portion of the recess region. An aluminum film is formed on the metal layer at a process temperature less than a reflow temperature of the metal layer to substantially fill the upper portion of the recess region after removing the metal layer. A metal film is formed on the aluminum  
10 layer.

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